**Experiment (7) Using a PEM Fuel Cell to Power the Small Fan/Wheel Motor Module and LED Module in Parallel**



**(i) Components Used**

* PEM Fuel Cell
* Hydrogen and Oxygen gas cylinders
* Tubing for gas transfer
* Connecting wires (red and black)
* Small fan/wheel motor module
* LED module
* Parallel circuit board / multiple terminal block

**(ii) Objectives**

* To demonstrate simultaneous powering of two loads (mechanical + electrical) using a PEM fuel cell
* To understand parallel circuit configurations
* To explore the performance of a fuel cell under multiple load conditions
* To simulate hybrid clean energy use (lighting + motion)

**(iii) Procedure**

1. First, we did gas preparation: Hydrogen and oxygen gases were first generated and stored using the electrolyzer (as done in earlier experiments).
2. Fuel Cell Setup: Gas tubes were connected securely to the PEM fuel cell to allow the electrochemical reaction to begin.
3. Parallel Wiring
* The fan/wheel module and LED module were connected in parallel using a common connection board.
* The red (positive) terminals of both modules were connected together and linked to the PEM fuel cell’s positive output.
* Likewise, black (negative) terminals were grouped and connected to the fuel cell’s negative output.
1. Power Activation: Once connected, hydrogen flow began powering the fuel cell.
2. The LED lit up and the fan motor spun at the same time, confirming both loads were successfully powered.

**(iv) Observations**

* Both the LED and the fan turned on simultaneously, with stable brightness and speed.
* The fan speed was slightly lower than in the standalone test (Experiment 6), due to shared power.
* The LED maintained steady brightness, showing the effectiveness of the parallel setup.
* When hydrogen was depleted, both outputs dropped evenly and stopped together.

**(v) Precautionary Measures**

* We double-checked polarity before making parallel connections.
* We used solid, stable wiring to avoid short circuits across the modules.
* We ensured the PEM fuel cell was not overloaded beyond its capacity.
* We operated the setup in a well-ventilated area due to gas handling.
* We avoided touching the fan blades or terminals during operation.